PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:	)	Confirmation No. 1280
	)	
Sandrine Dulac et al.	)	Group Art Unit: 1794
	)	
Serial No: 10/596,060	)	Examiner: Jason L. Savage
	)	
Filed: May 26, 2006	)	Docket No. 007035.00008
	)	
For: Aluminum Alloy Strip for Brazing	)	

RULE 132 DECLARATION

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

I, Sylvain Henry, hereby declare as follows:

1. I am an inventor of the claimed invention of the above-identified application ("the instant application").

2. I have a PhD degree dated 1999 in Material Science from the Swiss Federal Institute of Technology Lausanne (Switzerland). I have worked in the aluminum industry for over 10 years specializing in brazing sheet products. I have been working for Alcan and its predecessor companies since more than 10 years. I am one of ordinary skill in the art in this field.

3. I have reviewed the instant application as well as the February 1, 2011 final Office Action, and in particular the translation of Ueda (JP 200303132) applied against the pending claims.

4. I am very familiar with the processes of heat exchanger brazing in general and fluxless brazing in particular.

Experiments were made in the early stages of the project that lead to the instant application. These experiments and the obtained results were recorded in an internal report, dated Feb. 03, 2006. This report was notarized on June 27, 2006.

The following core alloy was cast:

	Si	Fe	Cu	Mn	Mg	Ti	Bi	Y
39xx+Y	0.39	0.24	0.64	0.57	0.45	0.09	-	0.056

This core alloy is fully within the scope of claim 1 of Ueda: the manganese (Mn) content of 0.57% is comprised between 0.05 and 2.0% as claimed by Ueda, and yttrium (Y) is added at a level of 0.056% comprised between 0.05 and 1.0%, also as claimed by Ueda.

The two following clad alloys were cast:

	Si	Fe	Cu	Mn	Mg	Ti	Bi	Y
AA4047	11.67	-	-	-	-	-	-	-
AA4047+Bi	11.67	-	-	-	-	-	0.19	-

AA4047 brazing clad is also fully within the scope of claim 1 of Ueda, which recites that the brazing clad alloy contains 6.0 – 12.5% Si or 0.4 – 5.5% Ge.

Brazing sheets were manufactured using the above presented materials, namely:

- 39xx+Y clad on one side with AA4047
- 39xx+Y clad on one side with AA4047+Bi

The brazing behavior of these sheets, without flux and in a nitrogen atmosphere, was evaluated using the "V on a coupon" test described in the instant application. The rating extends from A (full brazing joint, all along the length of the "V") to E (no brazing at all).

The results are given in the following table:

Brazing sheet	Brazeability rating
39xx+Y clad AA4047	E – E
39xx+Y clad AA4047+Bi	A – A

Thus, the brazing sheet composed of 39xx+Y core and AA4047 clad, fully consistent with and within the scope of what is claimed in Ueda, cannot perform fluxless brazing under nitrogen atmosphere.

5. The results described above showed that a brazing sheet as claimed in Ueda cannot perform fluxless brazing in a nitrogen atmosphere. An additional element, like Bi exemplified above (and in the instant application), is needed in the clad alloy. Such an addition can only be considered if it does not lead to any risk of inhibiting the effect of the invention of Ueda, which is to obtain a very good erosion behavior. This was clearly stated in the office action on page 3, "Ueda is silent to the brazing alloy containing one of

the claimed elements however it teaches that the braze alloy may contain other elements in a range which does not inhibit the effect of the present invention". However, Bi addition in a clad alloy is reported in several documents as detrimental to erosion resistance.

Two patent abstracts, available in the "ALUMINIUM" database, edited by Cambridge Scientific Abstract, are included below.

The first one is related to Furukawa patent JP 59126747 A, with a priority date of Jan. 06, 1983 and states: "Vacuum solderability is improved by Bi, but **the presence of Bi causes the formation of an erosion groove in a core layer into which molten alloy has flowed**".

The second one is related to Sky Aluminium JP 55057374, with a priority date of Oct. 26, 1978 and states "**a brazing sheet of Al--Si--Mg--Bi alloy is used to a portion requiring no consideration of erosion**, for example, side plate having thickness < 1 mm, **while a brazing sheet of Al--Si--Mg or Al--Si brazing alloy to thin portion of fin material** in the case of producing a heat exchanger". It is clear from this abstract that the addition of Bi is avoided (Al-Si-Mg or Al-Si brazing alloy, with no Bi, is used) when erosion must be avoided (i.e. here, when the components are thin).

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COPYRIGHT (C) 2011 Cambridge Scientific Abstracts (CSA)
L2     ANSWER 1 OF 1  ALUMINIUM  COPYRIGHT 2011 CSA on STN
AN     19850645-0255  ALUMINIUM       Full-text
TI     Brazing Sheet for Vacuum
       Bonding Aluminum Body.
PA     Furukawa Aluminium Co Ltd
PI     JP 59126747  A
AI     19830106
DT     Patent
AV     Patent
AB      The brazing sheet comprises a core layer of a corrosion resistant
        Al alloy having one or both surfaces clad with an Al alloy which
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has the composition of, by weight, 10.7-13.0% Si, 0.4-2.0% Mg, bismuth maximum 0.1% and the balance Al and impurities. Magnesium and Si contents in the alloy satisfy the relationship of Mg% not > --16 x Bi% + 2%. The sheet is useful for vacuum brazing a heat exchanger, e.g. an oil cooler, radiator, evaporator or condenser. Vacuum solderability is improved by Bi, but the presence of Bi causes the formation of an erosion groove in a core layer into which molten alloy has flowed. The erosion groove is now suppressed by controlling the relationship between Mg and Si contents, without the deterioration of brazing properties.--DCPI.

L8 ANSWER 5 OF 8 ALUMINIUM COPYRIGHT 2011 CSA on STN
AN 19800945-0281 ALUMINIUM Full-text
TI Vacuum Brazing of Aluminum.
PA Sky Aluminium
PI JP 55057374 A
AI 19781026
DT Patent
AV Patent
AB In the vacuum brazing of an Al material by simultaneously using an Al--Si--Mg--Bi brazing alloy and Al--Si--Mg and/or Al--Si brazing alloys within vacuum furnaces in the same batch, total amounts of Mg and bismuth in the brazing alloys satisfy a formula as converted to each per unit volume within the furnace; and a brazing sheet of Al--Si--Mg--Bi alloy is used to a portion requiring no consideration of erosion, for example, side plate having thickness < 1 mm, while a brazing sheet of Al--Si--Mg or Al--Si brazing alloy to thin portion of fin material in the case of producing a heat exchanger. Contents of the Si, Mg and Bi are 6-12%, 0.6-3.0% and 0.02-1%, respectively. Influence of effect due to Bi-including brazing alloy is exerted to the Bi-free brazing alloy, so that the latter can be brazed also in a low-grade vacuum of 10--3 to 10--4 torr.--DCPI.

Knowing these documents, which clearly belong to the field of Ueda's invention, one skilled in the art would have avoided adding Bi to the clad alloy of Ueda and thus would not have arrived to the invention described in the instant application.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18

of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

April 15, 2011

Date

Sylvain Henry